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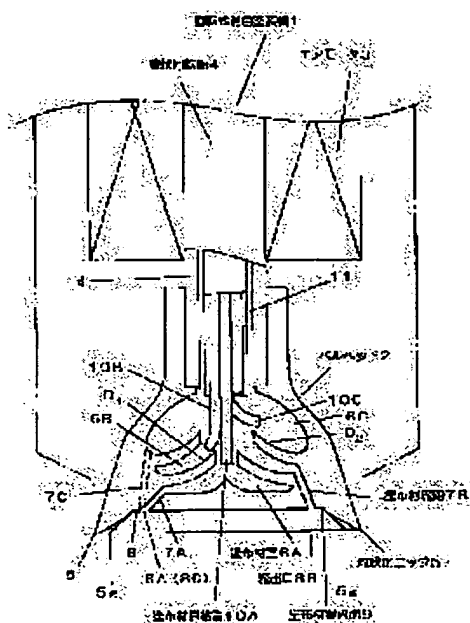
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(72)Inventor : ISHIKAWA KATSUHIRO  
SATO YASUSHI

(54) ROTARY COMPOUND-COLOR COATING MACHINE AND COATING BELL HEAD USED IN THE MACHINE



(57)Abstract:

**PROBLEM TO BE SOLVED:** To deposit respective coating material grains in a mixed state without mixing the respective materials when granulating plural kinds of coating materials and applying them.

**SOLUTION:** The inside of a bell head (2) is concentrically divided to form plural coating material chambers (6A-6C) to be supplied with a coating material from the rear side, and the respective outlets (8A-8C) of coating material passages (7A-7C) for discharging the coating material supplied to the respective chambers (6A-6C) to the front side of the bell head (2) are arranged on the same circumference.

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## CLAIMS

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**[Claim(s)]**

[Claim 1] In microatomization or a revolving mixed-colors coating machine made to coarse-grain-ize with coating material granulation edge (5) which supplied two or more kinds of coating materials to a bell head (2, 22) to rotate, and was formed at the tip, An inside of said bell head (2, 22) is divided in same mind, and two or more coating material rooms (6A-6C) which receive supply of a coating material from the back side are formed, A tap hole (8A-8C) of each coating material channel (7A-7C) into which a coating material is made to flow according to a centrifugal force which acts on each coating material room (6A-6C) concerned, An opening is carried out to a coating material slideway (9) which shows said coating material granulation edge (5) to a coating material, and it is arranged on the same circumference, A revolving mixed-colors coating machine, wherein two or more coating material feed pipes (10A-10C) which feed a coating material into each coating material room (6A-6C) of said bell head (2, 22) are inserted in and allocated in the tubular axis of rotation (4) which supports the bell head (2, 22) concerned.

[Claim 2] They are microatomization or a coarse-grain-ized bell head for paint with coating material granulation edge (5) formed at the tip of a centrifugal force in two or more kinds of coating materials supplied simultaneously, Two or more coating material rooms (6A-6C) which an inside is divided in same mind and receive supply of a coating material from the back side are formed, and. A tap hole (8A-8C) of each coating material channel (7A-7C) into which a coating material is made to flow according to a centrifugal force which acts on each coating material room (6A-6C) concerned, A bell head for paint which having carried out the opening to a coating material slideway (9) which shows said coating material granulation edge (5) to a coating material, and arranging on the same circumference.

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**DETAILED DESCRIPTION**

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**[Detailed Description of the Invention]****[0001]**

[Field of the Invention] This invention relates to the bell head for paint which uses simultaneously two or more kinds of coating materials for microatomization or the revolving mixed-colors coating machine which makes coarse-grain-ize, and with which a coated object is made to plaster, and it.

**[0002]**

[Description of the Prior Art] Mixed-colors paint is what forms the coat which made the paint of monochrome two color adhere to the painted surface of a coated object in microatomization or the state where it was made to coarse-grain-ize, and, for example, made the black spot and the white spot intermingled innumerable, In order to present different effect from the case where it paints in the gray monochrome paints which mixed black and white, it is beginning to be used as special paint for an ornament.

[0003] By the way, when performing such mixed-colors paint to a portion with a large area of an automobile body, a bumper, etc., Supply the paint of a two color to the bell head of the revolving electrostatic-coating machine with which a comparatively big coating pattern is obtained, and. the bell head (rotary atomization head) — about 7000 rpm — if it is made to rotate comparatively at a low speed, each charge of a color coat can be coarse-grain-ized, and can be painted (refer to JP,10-128166,A and JP,11-188306,A).

[0004]The coating room 34 which has the annular opening 33 centering on the axis of rotation 31 is formed in the back side of the bell head 32 which shows such a mixed-colors coating machine and was attached at the tip of the axis of rotation 31, and drawing 4. The two coating material supply pipes 35A and 35B were inserted in in the coating room 34 from the opening 33 concerned, and it has accomplished so that each charge of a color coat may be dropped in the coating room 34.

[0005]The paint discharge hole 36 which passes to the tip side is formed in the edge part of the coating room 34.

The paint dropped in the coating room 34 from said coating material supply pipes 35A and 35B, the time of separating from the edge 37 which flowed through the inside of the coating room 34 toward the periphery according to the centrifugal force of the bell head 32, was supplied to the tip side of the bell head 32 through the paint discharge hole 36, and was formed at the tip — microatomization — or — coarse grain — it is-izing and breathed out.

[0006]

[Problem(s) to be Solved by the Invention]However, when mixed-colors paint of a black paint and a white paint was performed using such a mixed-colors coating machine and the coat was observed more in details, it became clear that a black spot and a white spot were intermingled, and it did not adhere, but adhered to the gray spot near black and the gray spot near white.

[0007]By the time it reaches the edge 37 of the bell head 32, a black paint and a white paint will cause color mixture, and this is considered that brightness is changing according to the rate of each paint.

[0008]That is, the black paint dropped in the coating room 34 serves as liquid membrane which flows into the periphery side over the slideway 38 in the coating room 34 from one coating material supply pipe 35A. And since a white paint will be dropped from the coating material supply pipe 35B of another side if the bell head 32 carries out half rotation, the liquid membrane of a white paint piles up on the liquid membrane of a black paint. Since the liquid membrane of black / white paint laps one by one whenever it carries out half rotation as a black paint is again dropped from the coating material supply pipe 35A and the liquid membrane of a black paint laps with the liquid membrane of a white paint if the bell head 32 carries out half rotation, The black paint which flows through the slideway 38, and a white paint become the gray mixed unevenly. therefore — since this gray paint is supplied to the edge 37 through each paint discharge hole 36 — a gray paint — microatomization — or even if it makes it coarse-grain-ize, a black spot and a white spot cannot be made intermingled

[0009]Then, this invention makes it the technical technical problem to enable it to plaster a coated object in the state where each coating material particle was made intermingled, without supplying two or more kinds of coating materials to a bell head, and mixing coating materials, microatomization or when making it coarse-grain-ize and applying.

[0010]

[Means for Solving the Problem]In order to solve this technical problem, an invention of claim 1, In microatomization or a revolving mixed-colors coating machine made to coarse-grain-ize with coating material granulation edge which supplied two or more kinds of coating materials to a bell head to rotate, and was formed at the tip, An inside of said bell head is divided in same mind, and two or more coating material rooms which receive supply of a coating material from the back side are formed, A tap hole of each coating

material channel into which a coating material is made to flow according to a centrifugal force which acts on each coating material room concerned, The opening was carried out to a coating material slideway which shows said coating material granulation edge to a coating material, it was arranged on the same circumference, and two or more coating material feed pipes which feed a coating material into each coating material room of said bell head were inserted in and allocated in the tubular axis of rotation which supports the bell head concerned.

[0011]An invention of claim 2 is a bell head for paint used for such a revolving mixed-colors coating machine, An inside is divided in same mind and two or more coating material rooms which receive supply of a coating material from the back side are formed, The opening of the tap hole of each coating material channel into which a coating material is made to flow according to a centrifugal force which acts on each coating material room concerned was carried out to a coating material slideway which shows said coating material granulation edge to a coating material, and it was arranged on the same circumference.

[0012]According to the invention in this application, when performing 3 color mixed-colors paint of red-and-blue yellow, a paint of red-and-blue yellow is independently supplied to each coating material room, for example, rotating a bell head which formed three coating material rooms which receive supply of a paint from the back side in same mind.

[0013]Each charge of a color coat passes along a coating material channel formed in each coating material room according to a centrifugal force of rotating \*\* RUHEDDO, it being flowed out and turned on a transverse-plane side of a bell head, without mixing each color, and reaching coating material granulation edge through a coating material slideway further from a tap hole of each coating material channel -- there -- microatomization -- or it is coarse-grain-ized and a coated object is plastered.

[0014]Since the opening of the tap hole of each coating material channel is carried out on the same circumference and each color coat cloth material flows toward coating material granulation edge from each tap hole according to a centrifugal force at this time, a field which mixing of coating materials is prevented certainly and is different by designing an interval of a tap hole suitably, respectively even if it may spread and flow into a sector somewhat -- individual -- microatomization -- or it is coarse-grain-ized.

[0015]the conditions that distance to coating material granulation edge is equal, therefore a coating material which flowed out of which tap hole also has it since each tap hole is formed on the same circumference --- microatomization -- or since it is coarse-grain-ized and becomes things, a granulation state of each coating material becomes abbreviated homogeneity. [ same ]

[0016]Therefore, mixed-colors paint independently plastered with a spot of each color coat cloth material of red-and-blue yellow innumably, respectively can be performed to a coated object, and it is not plastered with a low brightness gray paint with which each color of red-and-blue yellow caused color mixture.

[0017]

[Embodiment of the Invention]Hereafter, an embodiment of the invention is concretely described based on a drawing. The sectional views and drawing 2 in which an example of the revolving mixed-colors coating machine which drawing 1 requires for claim 1 is shown are the front view and a sectional view showing the embodiment of others [ drawing 3 ].

[0018]The revolving mixed-colors coating machine 1 shown in drawing 1 is attached at the tip of the tubular

axis of rotation 4 at which microatomization or the bell head 2 made to coarse-grain-ize rotates a paint by a 2000 – 10000 rpm grade with the air motor 3.

[0019]The three coating material rooms 6A–6C where the coating material granulation edge 5 is formed in the apex peripheral edge part by the side of a transverse plane, and the bell head 2 receives supply of a coating material from the back side are formed. The coating material granulation edge 5 allots radiate 5g of slot — annularly, and is formed, a center divides the inside of the bell head 2 with Yamagata disk  $D_1$  of two sheets and  $D_2$  by which the opening was carried out up and down in same mind, and the coating material rooms 6A–6C are formed. And each center of these granulation edge 5 and the coating material rooms 6A–6C is in agreement with the center of rotation of the bell head 2.

[0020]To the bell head 2, so that the coating material supplied in each coating material room 6A – 6C can be made to flow into the inner circumference side of the coating material granulation edge 5 with the centrifugal force which acts on each coating material rooms 6A–6C by rotation of the bell head 2, The coating material channels 7A–7C which inclined outward from the edge part of each coating material rooms 6A–6C are formed.

[0021]And the opening of the tap holes 8A–8C of the coating material channels 7A–7C is carried out to the coating material slideway 9 which shows the coating material granulation edge 5 to a coating material, Said edge 5 and the coating material which are drawn in same mind and which the opening is carried out a little on the same circumference of a byway, and flowed out of these each tap holes 8A–8C are transmitted to the coating material slideway 9 of the transverse plane of the bell head 2, and reaches the coating material granulation edge 5.

[0022]In this example, in the coating material channels 7A–7C, every six a total of 18 each are formed, and the opening of the tap holes 8A–8C is conformally carried out according to 20 degrees of central angles. This angle is a thing in consideration of the width which will spread by the time the coating material which flows out of the tap holes 8A–8C, and flows through the coating material slideway 9 reaches the coating material granulation edge 5, and it is designed so that each coating material may be coarse-grain-ized and may not be mutually mixed in the fields 5A–5C in which the coating material granulation edge 5 differs.

[0023]The guide pipe 11 which piped the coating material feed pipes 10A–10C which supply the coating material of arbitrary colors at each coating material rooms 6A–6C in the tubular axis of rotation 4 of the air motor 3 which attached the bell head 2 is inserted in the noncontact state.

[0024]And the coating material feed pipe 10A which supplies a coating material to the coating material room 6A by the side of a transverse plane penetrates the central opening of disk  $D_2$  and  $D_1$  through the center of rotation of the bell head 2, and is straightly installed in the coating material room 6A.

[0025]The coating material feed pipes 10B and 10C which supply a coating material to the coating material rooms 6B and 6C, It was installed in each coating material room 6B and 6C, the tip was curved and formed a little in the method of outside so that a coating material could be dropped at the upper surface of disk  $D_1$  and  $D_2$ , respectively, and it has accomplished so that a coating material may not flow into other coating material rooms.

[0026]The above is example composition of this invention, next the paint of red-and-blue yellow is made to supply and coarse-grain-ize, and the operation is explained about the case where carry out electrostatic-spraying arrival to the grounded coated object, and mixed-colors paint is performed.

[0027]Rotating the air motor 3 by low-speed 2000 – 10000 rpm comparatively, about [ –60—120kV ] high tension is impressed to the bell head 2, and each charge of a color coat is individually supplied to the coating material rooms 6A–6C via the coating material feed pipes 10A–10C. Each charge of a color coat supplied in the coating material room 6A – 6C flows out of each tap holes 8A–8C into the transverse-plane side of the bell head 2 independently through the coating material channels 7A–7C according to a centrifugal force, is transmitted to the coating material slideway 9, and reaches the coating material granulation edge 5.

[0028]At this time, each charge of a color coat which flows through the coating material slideway 9 spreads in a sector somewhat, as shown in drawing 2, but since the opening of each tap holes 8A–8C is carried out on the same circumference, that spread width is approximately regulated, and since it is formed at intervals of 20 degrees in consideration of that spread width, each charge of a color coat is not mixed.

[0029]Thus, since each charge of a color coat is independently supplied to the fields 5A–5C to which the coating material granulation edge 5 differs and is coarse-grain-ized independently, The paint of three colors is mixed and it does not become low brightness gray, and a red spot point, a blue spot, and yellow dots can be made intermingled in a coated object, it can be made to plaster, and it becomes different emotive mixed-colors paint from monochrome paint of low brightness gray.

[0030]Drawing 3 shows other revolving mixed-colors coating machines concerning this invention. Identical codes are attached about the portion which overlaps with drawing 1, and detailed explanation is omitted.

[0031]The bell head 22 with which the revolving mixed-colors coating machine 21 of this example was equipped is divided with the disk D of Yamagata where the inside formed the opening in the center up and down, and the two coating material rooms 6A and 6B which receive supply of a coating material from the back side are formed.

[0032]The guide pipe 11 which piped the coating material feed pipes 10A–10C which supply various kinds of coating materials to each coating material rooms 6A and 6B in the tubular axis of rotation 4 of the air motor 3 which attached the bell head 22 is inserted in the noncontact state.

[0033]And in this example, a red paint is supplied to the coating material room 6A by the side of a transverse plane via the coating material feed pipe 10A, and a blue paint and a white paint are supplied to the coating material room 6B by the side of the back via the coating material feed pipes 10B and 10C.

[0034]Here, the flow control of the blue paint and white paint which are supplied by the coating material feed pipes 10B and 10C is carried out, respectively so that a flow control may be carried out and the rate of a delivery late can be set up arbitrarily, and in the coating material room 6B, blue and white serve as a \*\*\*\* mixing paint mixed unevenly.

[0035]therefore — from the coating material room 6B, through the coating material channel 7B, a \*\*\*\* mixing paint is supplied to the coating material atomization edge 5, and a red paint is independently supplied to the field to which each differs in the coating material granulation edge 5 from the coating material room 6A — separate — microatomization — or it is coarse-grain-ized.

[0036]In this case, in the paint particles of the \*\*\*\* mixing paint with which the near light-blue spot and the light-blue spot near white were included in the coated object blue, The coat which made the red spot point of not being mixed with these intermingled independently can be formed, and furthermore mixed paint and mixed-colors paint combined, the decoration from which effect differs can be performed.

[0037]If it paints changing the mixing ratio of a blue paint and a white paint, the background of a red spot

point, The decoration carried out like the gradation paint from which color changes gradually can be given like the portion of only a partial-white spot with many light-blue spots near partial-white with many light-blue spots near the partial-blue of only a blue spot.

[0038]If the coating material rooms 6A-6C formed in the bell head 2 and 22 are plurality, they are arbitrary, and their color, kind, and number of the coating materials supplied to each coating material rooms 6A-6C are also arbitrary. [ of the number ]

[0039]For example, if a paint is supplied to the coating material rooms 6A and 6B of the revolving mixed-colors coating machine 1 shown in drawing 1 and thinner is supplied to 6C, since a paint spreads, the place with which the particles of thinner and the particles of the paint lapped can give the decoration which made the spot pattern which spread, and the spot pattern without a blot intermingled.

[0040]the metallic system which uses the same color paint with which which character without not only the paint of different colors but those with gloss and gloss differs, or contains glittering materials, such as aluminum mica, — in paints, the same color paint with which viscosity differs at the time of paint may be used, or mixed-colors paint may be performed using the same color paint which changed the paints ratio. It may be a case where supply a plural color [ every ] paint to the one coating material rooms 6A-6C, or a same color paint is supplied with two or more coating material feed pipes.

[0041]It is made to rotate at tens of thousands of rpm like the time of carrying out rotation atomization instead of what is restricted when rotating the bell head 2 by low-speed 2000 – 10000 rpm comparatively and coarse-grain-izing a paint, and may be made to microatomize a paint.

[0042]In order to microatomize a paint to the bell head used for the usual coating machine, about hundreds-700 slots are radiately engraved at the tip of paint granulation edge, but. Since the bell heads 2 and 22 used for the revolving mixed-colors coating machines 1 and 21 make a paint coarse-grain-ize, their \*\*\*\*\* is also good to about tens of pieces in 5 g of slots formed at the tip of the paint granulation edge 5.

[0043]In order to change the size of a spot for every paint, further again the pitch of 5 g of slots and the depth which are formed in the fields 5A-5C of the paint granulation edge 5 which the paint which flowed out of each tap holes 8A-8C attains, It may change into each field 5A – every 5C, the number of the coating material channels 7A-7C, an inside diameter, and the caliber of each tap holes 8A-8C may be arbitrarily set to each coating material room 6A – every 6C, or each coating material may be supplied by a flow which is different in each coating material feed pipe 10A – every 10C.

[0044]Although above-mentioned explanation explained the case where each of all the tap holes 8A-8C were formed at equal intervals, if the coating materials which flow out of each coating material rooms 6A-6C are not mixed, opening formation of each adjoining tap holes 8A-8C may be carried out at arbitrary intervals.

[0045]

[Effect of the Invention]a field which according to the invention in this application each coating material room formed in the bell head is supplied, two or more coating materials flow out of each coating material room independently, reach coating material atomization edge, and is different, respectively as stated above — microatomization — or, since it is coarse-grain-ized, There is a very outstanding effect that the mixed-colors paint in which each coating material particle is intermingled independently can be performed without the coating materials which flowed out of a different coating material room causing color mixture.

[Brief Description of the Drawings]

[Drawing 1] The sectional view showing an example of the revolving mixed-colors coating machine concerning this invention.

[Drawing 2] The front view.

[Drawing 3] The sectional view showing other examples.

[Drawing 4] The explanatory view showing a device conventionally.

[Description of Notations]

1, 21 ..... Revolving mixed-colors coating machine

2, 22 ..... Bell head

4 ..... Tubular axis of rotation 5 ..... Coating material granulation edge

6A-6C ..... Coating material room

7A-7C ..... Coating material channel

8A-8C ..... Tap hole

9 ..... Coating material slideway

10A-10C .... Coating material feed pipe

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[Translation done.]



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(71)出願人 000110343

トリニティ工業株式会社

愛知県豊田市柿本町1丁目9番地

(72)発明者 石 川 勝 浩

愛知県豊田市柿本町一丁目9番地 トリニ  
ティ工業株式会社内

(72)発明者 佐 藤 泰

愛知県豊田市柿本町一丁目9番地 トリニ  
ティ工業株式会社内

(74)代理人 100084984

弁理士 澤野 勝文 (外1名)

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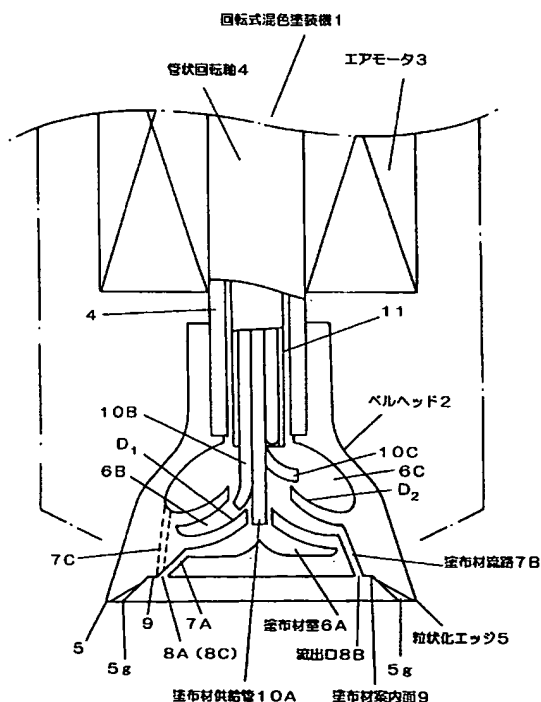
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(54)【発明の名称】 回転式混色塗装機及びそれに使用する塗装用ベルヘッド

(57)【要約】

【課題】複数種類の塗布材を粒状化させて塗布する場合に、夫々の塗布材同士を混合させずに、各塗布材粒子を混在した状態に塗着させる。

【解決手段】ベルヘッド(2)の内部を同心的に仕切って、背面側から塗布材の供給を受ける複数の塗布材室(6A~6C)を形成し、各塗布材室(6A~6C)に送給された塗布材をベルヘッド(2)の正面側に流出させる夫々の塗布材流路(7A~7C)の流出口(8A~8C)を同一円周上に配列した。



## 【特許請求の範囲】

【請求項1】回転駆動されるベルヘッド(2、22)に複数種類の塗布材を供給して、その先端に形成された塗布材粒状化エッジ(5)で微粒化又は粗粒化させる回転式混色塗装機において、

前記ベルヘッド(2、22)の内部が同心的に仕切られて、背面側から塗布材の供給を受ける複数の塗布材室(6A~6C)が形成され、当該各塗布材室(6A~6C)に作用する遠心力により塗布材を流出させる夫々の塗布材流路(7A~7C)の流出口(8A~8C)が、前記塗布材粒状化エッジ(5)に塗布材を案内する塗布材案内面(9)に開口されて同一円周上に配列され、前記ベルヘッド(2、22)の各塗布材室(6A~6C)に塗布材を送給する複数の塗布材供給管(10A~10C)が当該ベルヘッド(2、22)を支持する管状回転軸(4)内に挿通して配設されたことを特徴とする回転式混色塗装機。

【請求項2】同時に供給される複数種類の塗布材を遠心力によりその先端に形成された塗布材粒状化エッジ(5)で微粒化又は粗粒化する塗装用ベルヘッドであって、

内部が同心的に仕切られて、背面側から塗布材の供給を受ける複数の塗布材室(6A~6C)が形成されると共に、当該各塗布材室(6A~6C)に作用する遠心力により塗布材を流出させる夫々の塗布材流路(7A~7C)の流出口(8A~8C)が、前記塗布材粒状化エッジ(5)に塗布材を案内する塗布材案内面(9)に開口されて同一円周上に配列されたことを特徴とする塗装用ベルヘッド。

## 【発明の詳細な説明】

## 【0001】

【発明の属する技術分野】 本発明は、複数種類の塗布材を同時に微粒化又は粗粒化させて被塗物に塗着させる回転式混色塗装機及びそれに使用する塗装用ベルヘッドに関する。

## 【0002】

【従来の技術】 混色塗装は、例えば、黒白二色の塗料を微粒化又は粗粒化させた状態で被塗物の塗装面に付着させて黒色斑点と白色斑点を無数に混在させた塗膜を形成するもので、黒と白を混合した灰色の単色塗料で塗装する場合とは異なる趣を呈するため、装飾用の特殊塗装として使用され始めている。

【0003】ところで、このような混色塗装を自動車ボディやバンパー等の面積の広い部分に施す場合は、比較的大きな塗装パターンのでられる回転式静電塗装機のベルヘッドに二色の塗料を供給すると共に、そのベルヘッド(回転霧化頭)を7000rpm程度の比較的低速で回転させると、各色塗料を粗粒化して塗装することができる(特開平10-128166号、特開平11-188306号公報参照)。

【0004】図4はこのような混色塗装機を示すもので、回転軸31の先端に取り付けられたベルヘッド32の背面側に、回転軸31を中心とする環状の開口部33を有する塗料室34が形成されると共に、当該開口部33から塗料室34内に二つの塗料供給管35A、35Bが挿通されて、塗料室34内に、各色塗料を滴下するように成されている。

【0005】塗料室34の周縁部には、先端側に通ずる塗料流出孔36が形成されており、前記塗料供給管35A、35Bから塗料室34内に滴下された塗料は、ベルヘッド32の遠心力により塗料室34内を周縁に向かって流れ、塗料流出孔36を通してベルヘッド32の先端側に供給され、その先端に形成されたエッジ37から離れるときに、微粒化又は粗粒化されて吐出される。

## 【0006】

【発明が解決しようとする課題】しかしながら、このような混色塗装機を用いて黒色塗料と白色塗料の混色塗装を行って、その塗膜をより詳細に観察したところ、黒色斑点と白色斑点が混在して付着されるのではなく、黒に近い灰色斑点と白に近い灰色斑点が付着されていることが判明した。

【0007】これは、ベルヘッド32のエッジ37に達するまでに、黒色塗料と白色塗料が色混じりを起こし、夫々の塗料の割合に応じて明度に変化していると考えられる。

【0008】すなわち、一方の塗料供給管35Aから塗料室34内に滴下された黒色塗料は、塗料室34内の案内面38に沿って外周側へ流れる液膜となる。そして、ベルヘッド32が半回転すると、他方の塗料供給管35Bから白色塗料が滴下されるので、黒色塗料の液膜の上に白色塗料の液膜が重ねられる。さらに、ベルヘッド32が半回転すると、再び塗料供給管35Aから黒色塗料が滴下されて、黒色塗料の液膜が白色塗料の液膜に重なるといように、半回転するごとに黒色/白色塗料の液膜が順次重なっていくので、案内面38を流れる黒色塗料と白色塗料が不均一に混ざり合った灰色になる。したがって、この灰色塗料が各塗料流出孔36を通りエッジ37に供給されるので、灰色塗料を微粒化又は粗粒化させても、黒色斑点と白色斑点を混在させることはできない。

【0009】そこで本発明は、複数種類の塗布材をベルヘッドに供給して微粒化又は粗粒化させて塗布する場合に、塗布材同士が混合することなく、夫々の塗布材粒子を混在させた状態で被塗物に塗着できるようにすることを技術的課題としている。

## 【0010】

【課題を解決するための手段】この課題を解決するために、請求項1の発明は、回転駆動されるベルヘッドに複数種類の塗布材を供給して、その先端に形成された塗布材粒状化エッジで微粒化又は粗粒化させる回転式混色塗

装置において、前記ベルヘッドの内部が同心的に仕切られて、背面側から塗布材の供給を受ける複数の塗布材室が形成され、当該各塗布材室に作用する遠心力により塗布材を流出させる夫々の塗布材流路の流出口が、前記塗布材粒状化エッジに塗布材を案内する塗布材案内面に開口されて同一円周上に配列され、前記ベルヘッドの各塗布材室に塗布材を送給する複数の塗布材供給管が当該ベルヘッドを支持する管状回転軸内に挿通して配設されたことを特徴とする。

【0011】また、請求項2の発明は、そのような回転式混色塗装機に使用する塗装用ベルヘッドであって、内部が同心的に仕切られて、背面側から塗布材の供給を受ける複数の塗布材室が形成され、当該各塗布材室に作用する遠心力により塗布材を流出させる夫々の塗布材流路の流出口が、前記塗布材粒状化エッジに塗布材を案内する塗布材案内面に開口されて同一円周上に配列されたことを特徴とする。

【0012】本願発明によれば、例えば、赤青黄の3色混色塗装を行なう場合、背面側から塗料の供給を受ける3つの塗布材室を同心的に形成したベルヘッドを回転させながら各塗布材室に赤青黄の塗料を別々に供給する。

【0013】各色塗料は、回転するベルヘッドの遠心力により、夫々の塗布材室に形成された塗布材流路を通り、各色が混ざることなくベルヘッドの正面側に流出され、さらに、各塗布材流路の流出口から塗布材案内面を通り塗布材粒状化エッジに達し、そこで微粒化又は粗粒化されて被塗物に塗着される。

【0014】このとき、各塗布材流路の流出口は同一円周上に開口されており、各色塗布材は遠心力により各流出口から塗布材粒状化エッジに向かって流れるので、多少扇形に広がって流れることがあっても、流出口の間隔を適当に設計することにより塗布材同士の混合が確実に防止され、夫々異なる領域で個別に微粒化又は粗粒化される。

【0015】また、各流出口が同一円周上に形成されていることから、塗布材粒状化エッジまでの距離が等しく、したがって、どの流出口から流出した塗布材も同じ条件で微粒化又は粗粒化されこととなるので、各塗布材の粒状化状態は略均一になる。

【0016】したがって、被塗物には、赤青黄の各色塗布材の斑点が夫々独立して無数に塗着された混色塗装を施すことができ、赤青黄の各色が色混じりを起こした低明度灰色塗料が塗着されることはない。

【0017】

【発明の実施の形態】 以下、本発明の実施の形態を図面に基づいて具体的に説明する。図1は請求項1に係る回転式混色塗装機の一例を示す断面図、図2はその正面図、図3は他の実施形態を示す断面図である。

【0018】図1に示す回転式混色塗装機1は、塗料を微粒化又は粗粒化させるベルヘッド2が、エアモータ3

により2000～10000 rpm程度で回転駆動される管状回転軸4の先端に取り付けられている。

【0019】ベルヘッド2は、正面側の先端周縁部に塗布材粒状化エッジ5が形成されると共に、背面側から塗布材の供給を受ける三つの塗布材室6A～6Cが形成されている。塗布材粒状化エッジ5は放射状の溝5g…を環状に配して形成され、塗布材室6A～6Cは、中心が開口された2枚の山形ディスクD<sub>1</sub>、D<sub>2</sub>でベルヘッド2内を同心的に上下に仕切って形成されている。そして、これら粒状化エッジ5及び塗布材室6A～6Cの中心は、いずれもベルヘッド2の回転中心と一致している。

【0020】また、ベルヘッド2には、夫々の塗布材室6A～6C内に供給された塗布材を、ベルヘッド2の回転により各塗布材室6A～6Cに作用する遠心力で塗布材粒状化エッジ5の内周側に流出させることができるように、各塗布材室6A～6Cの周縁部から外向きに傾斜した塗布材流路7A～7Cが形成されている。

【0021】そして、塗布材流路7A～7Cの流出口8A～8Cが塗布材粒状化エッジ5に塗布材を案内する塗布材案内面9に開口され、前記エッジ5と同心的に描かれるやや小径の同一円周上に開口されており、これら各流出口8A～8Cから流出した塗布材は、ベルヘッド2の正面の塗布材案内面9を伝って塗布材粒状化エッジ5に達する。

【0022】なお、本例では、塗布材流路7A～7Cは各6本ずつ合計18本が形成されており、その流出口8A～8Cが、中心角20°で等角的に開口されている。この角度は、流出口8A～8Cから流出して塗布材案内面9を流れる塗布材が塗布材粒状化エッジ5に達するまでに広がる幅を考慮したもので、各塗布材が塗布材粒状化エッジ5の異なる領域5A～5Cで粗粒化され、互いに混ざらないように設計されている。

【0023】また、ベルヘッド2を取り付けたエアモータ3の管状回転軸4内には、各塗布材室6A～6Cに任意の色の塗布材を供給する塗布材供給管10A～10Cを配管したガイドパイプ11が非接触状態で挿通されている。

【0024】そして、正面側の塗布材室6Aに塗布材を供給する塗布材供給管10Aは、ベルヘッド2の回転中心を通りディスクD<sub>2</sub>、D<sub>1</sub>の中心開口部を貫通して塗布材室6A内まで真っ直ぐに延設されている。

【0025】また、塗布材室6B、6Cに塗布材を供給する塗布材供給管10B、10Cは、夫々の塗布材室6B、6C内まで延設され、それぞれディスクD<sub>1</sub>、D<sub>2</sub>の上面に塗布材を滴下することができるようにその先端がやや外方に湾曲して形成され、塗布材が他の塗布材室に流入しないように成されている。

【0026】以上が本発明の一例構成であって、次に、赤青黄の塗料を供給して粗粒化させ、アースされた被塗

物に静電塗着させて混色塗装を行う場合について、その作用を説明する。

【0027】エアモータ3を比較的低速の2000~10000rpmで回転駆動しながら、ベルヘッド2に-60~-120kV程度の高電圧を印加し、塗布材供給管10A~10Cを介して塗布材室6A~6Cに各色塗料を個別に供給する。塗布材室6A~6C内に供給された各色塗料は遠心力により塗布材流路7A~7Cを通過して各流出口8A~8Cからベルヘッド2の正面側に別々に流出され、塗布材案内面9を伝って塗布材粒状化エッジ5に達する。

【0028】このとき、塗布材案内面9を流れる各色塗料は、図2に示すように多少扇形に広がるが、各流出口8A~8Cは同一円周上に開口されているので、その広がり幅が略一定であり、また、その広がり幅を考慮して20°間隔で形成されているので、各色塗料が混ざることもない。

【0029】このようにして、各色塗料は、塗布材粒状化エッジ5の異なる領域5A~5Cに別々に供給されて別々に粗粒化されるので、三色の塗料が混ざって低明度灰色になることはなく、被塗物に、赤色斑点、青色斑点、黄色斑点を混在させて塗着させることができ、低明度灰色の単色塗装とは異なった趣の混色塗装となる。

【0030】また、図3は本発明に係る他の回転式混色塗装機を示す。図1と重複する部分については同一符号を付して詳細説明は省略する。

【0031】本例の回転式混色塗装機21に装着されたベルヘッド22は、その内部が中心に開口部を形成した山形のディスクDで上下に仕切られて、背面側から塗布材の供給を受ける二つの塗布材室6A、6Bが形成されている。

【0032】また、ベルヘッド22を取り付けたエアモータ3の管状回転軸4内には、各塗布材室6A、6Bに各種の塗布材を供給する塗布材供給管10A~10Cを配管したガイドパイプ11が非接触状態に挿通されている。

【0033】そして、本例では、正面側の塗布材室6Aに塗布材供給管10Aを介して赤色塗料が供給されると共に、背面側の塗布材室6Bに塗布材供給管10B、10Cを介して青色塗料、白色塗料が供給される。

【0034】ここで、塗布材供給管10B、10Cにより供給される青色塗料及び白色塗料は夫々流量コントロールされて供給比率を任意に設定できるように夫々流量コントロールされており、塗布材室6B内では青色と白色が不均一に混合された青白混合塗料となる。

【0035】したがって、塗布材室6Aからは赤色塗料が、塗布材室6Bからは塗布材流路7Bを通り青白混合塗料が、塗布材霧化エッジ5に供給され、それぞれが塗布材粒状化エッジ5の異なる領域に別々に供給され、別々に微粒化又は粗粒化される。

【0036】この場合、被塗物には、青色に近い水色斑点と白色に近い水色斑点が含まれた青白混合塗料の塗料粒子の中に、これらとは混ざることのない赤色斑点を独立して混在させた塗膜を形成することができ、混合塗装と混色塗装が組み合わさったさらに趣の異なる加飾を行なうことができる。

【0037】また、青色塗料と白色塗料の混合比率を変えながら塗装すれば、赤色斑点の背景を、青色斑点のみの部分-青に近い水色斑点の多い部分-白に近い水色斑点の多い部分-白色斑点のみの部分というように徐々に色彩が変化するグラデーション塗装のようにした加飾を施すことができる。

【0038】なお、ベルヘッド2、22内に形成する塗布材室6A~6Cは複数であればその数は任意であり、また、各塗布材室6A~6Cに供給する塗布材の色、種類及び数も任意である。

【0039】例えば、図1に示す回転式混色塗装機1の塗布材室6A、6Bに塗料を供給し、6Cにシンナーを供給すれば、シンナーの粒子と塗料の粒子が重なったところは塗料が滲むので、滲んだ斑点模様と滲みのない斑点模様を混在させた加飾を施すことができる。

【0040】また、色違いの塗料に限らず、艶有りと艶無しなどの性質の異なる同色塗料を用いたり、アルミ・マイカなどの光輝材を含むメタリック系塗料などでは塗装時に粘度の異なる同色塗料を用いたり、顔料比率を変えた同色塗料を用いて混色塗装を行ってもよい。さらに、一つの塗布材室6A~6Cに、複数色ずつ塗料を供給したり、同色塗料を複数の塗布材供給管で供給する場合であってもよい。

【0041】さらに、ベルヘッド2を比較的低速の2000~10000rpmで回転させ塗料を粗粒化する場合に限るのではなく、回転霧化するときと同様に数万rpmで回転させて塗料を微粒化するようにしてもよい。

【0042】また、通常の塗装機に用いられるベルヘッドには、塗料を微粒化するために、塗料粒状化エッジの先端に、数百~700本程度の溝が放射状に刻設されているが、回転式混色塗装機1、21に用いられるベルヘッド2、22は、塗料を粗粒化させるために、塗料粒状化エッジ5の先端に形成される溝5gを数十個程度まで減らしてもよい。

【0043】さらにまた、各塗料毎に斑点の大きさを変えるために、各流出口8A~8Cから流出した塗料が達する塗料粒状化エッジ5の領域5A~5Cに形成される溝5gのピッチや深さを、夫々の領域5A~5C毎に変えたり、各塗布材室6A~6Cごとに塗布材流路7A~7Cの数や内径、各流出口8A~8Cの口径を任意に設定したり、各塗布材供給管10A~10Cごとに異なる流量で各塗布材を供給してもよい。

【0044】さらに、上述の説明では、全ての各流出口8A~8Cを等間隔に形成した場合について説明した

が、各塗布材室6A～6Cから流出される塗布材同士が混ざらなければ、隣接する各流出口8A～8Cを任意の間隔で開口形成してもよい。

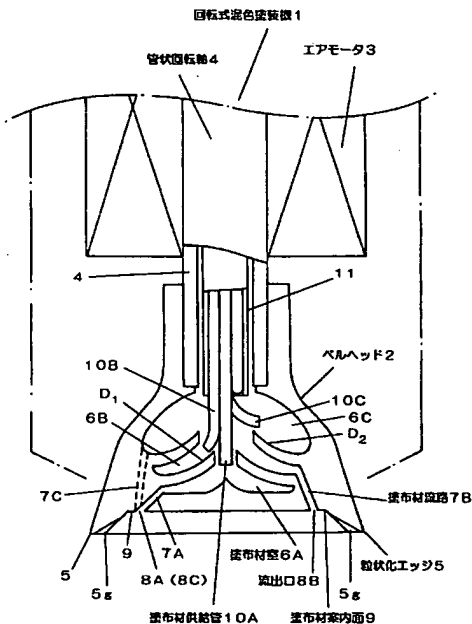
【0045】

【発明の効果】以上述べたように、本願発明によれば、複数の塗布材がベルヘッドに形成された各塗布材室に供給され、各塗布材室から別々に流出して塗布材霧化エッジに達し、夫々異なる領域で微粒化又は粗粒化されるので、異なる塗布材室から流出した塗布材同士が色混じりを起こすことなく、各塗布材粒子が独立して混在する混色塗装を行うことができるという大変優れた効果がある。

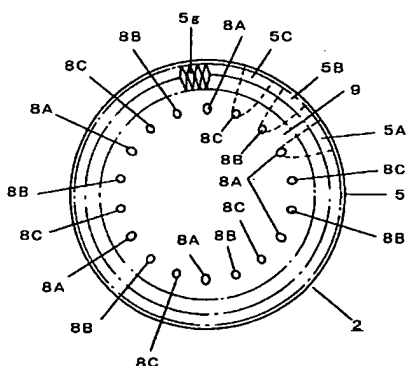
【図面の簡単な説明】

【図1】本発明に係る回転式混色塗装機の一例を示す断

【図1】



【図3】



面図。

【図2】その正面図。

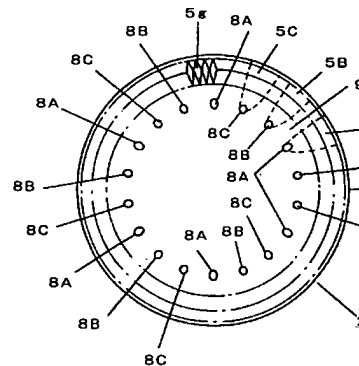
【図3】他の実施例を示す断面図。

【図4】従来装置を示す説明図。

【符号の説明】

- 1, 21.....回転式混色塗装機
- 2, 22.....ベルヘッド
- 4.....管状回転軸
- 5.....塗布材粒状化エッジ
- 6A～6C.....塗布材室
- 7A～7C.....塗布材流路
- 8A～8C.....流出口
- 9.....塗布材案内面
- 10A～10C.....塗布材供給管

【図2】



【図4】

